

Claims 2-6 have been rejected under 35 USC 103(a) as being unpatentable (obvious) over Green in view of Sullivan et al. (Sullivan) and O'Lenick et al. (O'Lenick).

The examiner has correctly summarized the here-claimed process in the paragraph bridging pages 4 and 5 of the office action.

The examiner has correctly summarized the teachings of the three references. However, applicants are of the opinion that the references have not been combined in the most logical manner, that no matter how they are combined they do not support a *prima facie* case of obviousness, and even if they did, there is sufficient evidence of record in the specification to rebut that *prima facie* case.

Although there is extensive argumentation already on the record, the arguments will be repeated here in a summarized form for easy reference by the examiner and, if necessary, by the Board of Appeals and Interferences.

Among the references cited by the examiner, O'Lenick is the closest prior art, since it discloses the preparation of γ -alkoxyamine by

- (a) (first step) cyanoethylation of an alcohol in the presence of an alkaline catalyst, such as KOH, NaOH, NaOCH₃ or an tetraalkylammoniumhydroxide, and
- (b) (second step) hydrogenation of the resulting β -alkoxynitrile in the presence of a hydrogenation catalyst (col. 4, lines 35-65, examples 1 and 10).

O'Lenick, however, does not disclose the use of a here-relevant catalyst in the first step. In Examples 1 and 10, where no free radical polymerization inhibitor was used, the

yield of the γ -alkoxyamine was only 58.2 and 68.2%, respectively. It is to be emphasized that the addition of free radical polymerization inhibitors to step (a) is the inventive improvement disclosed by O'Lenick.

Sullivan neither discloses a process for the preparation of γ -alkoxyamines nor a process for making the β -alkoxynitrile-intermediates. Only γ -alkylthioamines are disclosed by Sullivan.

Green teaches the use of diazabicycloalkenes for the 1,4-addition of alcohols to activated olefins, such as α,β -unsaturated nitriles, to give β -alkoxynitriles as product. This document does not disclose anything about the workup of the reaction products. All yields given in the examples are determined in the crude reaction products. The fact is important that Green also teaches that the diazabicycloalkene catalyst will also catalyze the breakdown of the product to give back the alcohol and the α,β -unsaturated nitrile under the same conditions (elevated temperature) as employed for the 1,4-addition-reaction (col. 4, line 3 and lines 12-30, and example 14), v.i.

Applicants believe that a more correct, in the traditional sense, statement of the rejection would have relied on O'Lenick in view of Green and Sullivan. Of course, applicants recognize that obviousness is based on what all the references teach in combination and the "in view of" terminology is merely a matter of exposition. However, proper exposition serves to better highlight the issues. The following arguments would be applicable to any exposition.

As already stated above, O'Lenick discloses the entire two-step process claimed here, i.e., addition of a hydroxy-compound to an α,β -unsaturated nitrile to form an alkoxynitrile, followed by hydrogenation to a γ -alkoxyamine. The essential difference between O'Lenick and the instant claims resides in the identity of the catalyst used in the first step. O'Lenick discloses only alkaline catalysts such as alkali metal hydroxides and alkoxides and quaternary ammonium hydroxides. The present claims, on the other hand, recite a class of diazabicycloalkenes as catalyst for the first step.

Green discloses the use of relevant diazabicycloalkenes to catalyze the relevant reaction, i.e. the first step of the claimed process.

Sullivan teaches the diazabicycloalkene catalysts but only for the addition of thiols and not alkanols. Thus, this reference really adds nothing of much relevance to the prior art evidence of obviousness. However, that reference does contribute to the evidence of nonobviousness.

At first blush, it could be considered *prima facie* obvious to utilize the Green catalysts for the first step of the O'Lenick (or here claimed) process. There is of record, however, additional evidence that would lead away from using the Green catalyst and not either removing it or neutralizing it prior to carrying out the hydrogenation step. Note that the limitation already present in the last phrase of claim 6, i.e. "and of the catalyst of formula I", has been emphasized by addition of the limitation added to step b), which more clearly and expressly excludes removal or neutralization of the catalyst.

H.A. Bruson, Organic Reactions, vol. 5, page 90, paragraph 3, lines 8-11, (of record) teaches that if an alkaline catalyst is used in the cyanoethylation of alcohols, this catalyst must be destroyed before workup since the β -alkoxynitrile product is readily dissociated (into the starting materials) by heat in the presence of the catalyst.

The Green reference itself, as discussed above, teaches that the 1,4-addition of alcohols to α,β -unsaturated nitriles in the presence of a diazabicycloalkene to give β -alkoxynitriles is an equilibrium reaction, i.e. the diazabicycloalkene catalyst, under the same conditions (elevated temperature), also catalyzes the breakdown of the product to give back the alcohol and the α,β -unsaturated nitrile.

Sullivan also teaches neutralization of the catalyst immediately following the analogous addition reaction (col. 7, lines 13-16).

In light of the above teachings, a person of ordinary skill in the art would have expected a significant loss in yield if a hydrogenation of a crude β -alkoxynitrile was performed at elevated temperature in the presence of basic addition catalyst. In other words, the art skilled would have either removed the basic catalyst used in the α,β -addition step, e.g. by an acid washing step, or destroyed or neutralized the same before proceeding with a subsequent hydrogenation of the crude β -alkoxynitrile (which is performed at elevated temperatures) in order to obtain the γ -alkoxyamine in high yields (see the instant specification at page 1, lines 31-41).

It should be clear from the above that when all of the evidence of record is

considered, applicants' claimed invention, which explicitly requires no removal or neutralization of diazabicycloalkane catalyst, could not be considered *prima facie* obvious to one of ordinary skill in the art. *In re Jones*, 958 F.2d 347, 351, 21 USPQ2d 1941, 1943-44 (Fed. Cir. 1992); *In re Fine*, 837 F.2d 1071, 1075, 5 USPQ2d 1596 (Fed. Cir. 1988); *In re Lalu*, 747 F.2d 703, 705, 223 USPQ 1257, 1258 (Fed. Cir. 1989). MPEP §§ 706.02(j), 2141-2143.03. With respect to the "teaching away" effect of Bruson and the portions of Green and Sullivan referred to, see *In re Baird*, 16 F.3d 380, 29 USPQ 1550 (Fed. Cir. 1994); *Akso N.V. v. U.S. International Trade Commission*, 808 F.2d 1471, 1480, 1 USPQ2d 1241, 1246 (Fed. Cir. 1986); *In re Marshall*, 578 F.2d 301, 198 USPQ 344 (CCPA 1978).

In view of the negative teachings discussed above there would not have been a reasonable expectation of success for a process in which no free radical polymerization inhibitors was used ("consisting essentially") and the first step catalyst remained in the hydrogenation step. *In re Fine, supra*; *In re Rinehart*, 531 F.2d 1048, 1053-54, 189 USPQ 143, 148 (CCPA 1976).

If, despite all that has gone before, one were to find a *prima facie* case of obviousness over all of the prior art evidence of record, there are unobvious results of record adequate to outweigh the evidence of obviousness.

Where O'Lenick uses no free radical inhibitor, Examples 1 and 10, yields of only 58.2% and 68.2%, respectively, are achieved. Where free radical initiator is used, yields

range from 61.1% (Example 3) to 98.6% (Example 11). Most of the examples resulted in yields no greater than 89% and many no greater than 85%.

In applicants' working examples, where no free radical polymerization inhibitor was used, the yields were 88%, 95.9% and 96%. These results are much better than those of O'Lenick without free radical polymerization inhibitor, and generally and consistently superior to those of O'Lenick even with free radical inhibitors.

Comparison of the results of the O'Lenick inventive examples and comparative examples also supports the prior stated conclusion that "consisting essentially" excludes those additives because they are demonstrated to "materially affect" the inventive process. For relevant authority, see MPEP § 2111.03 and cases cited therein.

The above remarks are considered to show conclusively that no *prima facie* case of obviousness has been established on this record, and, if there had been, it would be rebutted by outweighing evidence of unobvious results. Thus, applicants consider that the rejections of record have been obviated and respectfully solicit allowance of the pending claims.

To the extent necessary, applicant(s) petition for an Extension of Time under 37 CFR 1.136. Please charge any shortage in fees due in connection with the filing of this paper, including Extension of Time fees to Deposit Account No. 11-0345. Please credit

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any excess fees to such deposit account.

Respectfully submitted,

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A handwritten signature in cursive script, appearing to read 'H B Keil', written in dark ink.

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